

# Michael Crawshaw

Ph.D. Student

George Mason University

Research Interests: Optimization for machine learning, Distributed optimization

✉ mrcrawsha@gmu.edu

🌐 Personal Website

🔗 Google Scholar

## EDUCATION

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### George Mason University

Ph.D. in Computer Science

2019 - Present

M.S. in Computer Science

2019 - 2022

Advisor: Mingrui Liu

### The Ohio State University

2015 - 2019

B.S. in Mathematics and Computer Science, Honors

## PUBLICATIONS

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### Federated Learning under Periodic Client Participation and Heterogeneous Data: A New Communication-Efficient Algorithm and Analysis

Michael Crawshaw, Mingrui Liu

Conference on Neural Information Processing Systems, 2024.

### Provable Benefits of Local Steps in Heterogeneous Federated Learning for Neural Networks: A Feature Learning Perspective

Yajie Bao, Michael Crawshaw, Mingrui Liu

International Conference on Machine Learning, 2024.

### Federated Learning with Client Subsampling, Data Heterogeneity, and Unbounded Smoothness: A New Algorithm and Lower Bounds

Michael Crawshaw\*, Yajie Bao\*, Mingrui Liu (\* denotes equal contribution)

Conference on Neural Information Processing Systems, 2023.

### EPISODE: Episodic Gradient Clipping with Periodic Resampled Corrections for Federated Learning with Heterogeneous Data

Michael Crawshaw, Yajie Bao, Mingrui Liu

International Conference on Learning Representations, 2023.

### Robustness to Unbounded Smoothness of Generalized SignSGD

(Alphabetical order) Michael Crawshaw, Mingrui Liu, Francesco Orabona, Wei Zhang, Zhenxun Zhuang

Neural Information Processing Systems, 2022.

### Fast Composite Optimization and Statistical Recovery in Federated Learning

Yajie Bao, Michael Crawshaw, Mingrui Liu

International Conference on Machine Learning, 2022.

## EMPLOYMENT

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### Olive

March 2018 - August 2019

Machine Learning Engineering Intern

- Developed computer vision functionality for desktop automation software with applications to healthcare operations.
- Trained deep neural networks for object detection with various techniques, including Faster R-CNN and DARTS.

## AWARDS

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Top Reviewer, NeurIPS

2023

Institute for Digital Innovation Predoctoral Fellowship, George Mason University

2022

NSF XSEDE startup allocation, National Science Foundation

2020

Summer Ph.D. Research Initiation Award, George Mason University

2020

Outstanding Graduate Teaching Assistant, George Mason University

2020

Gordon Memorial Fund Scholarship, The Ohio State University

2017 - 2019

Honorable Mention, Raser-Bareis-Gordon Math Competition, The Ohio State University

2017

7th Place, FIRST Tech Challenge World Competition, FIRST

2015

## ACADEMIC SERVICE

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Reviewer, AISTATS 2024

Reviewer, NeurIPS 2023 - designated Top Reviewer (8% acceptance), awarded free conference registration

## TEACHING

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### **Graduate Teaching Assistant**, George Mason University

2019-2022

CS 657: Mining Massive Datasets

Fall 2020, Fall 2021

CS 471: Operating Systems

Fall 2020, Fall 2021, Spring 2022

CS 583: Analysis of Algorithms

Spring 2021

CS 571: Operating Systems

Spring 2021

CS 330: Formal Methods and Models

Fall 2019, Spring 2020

### **Undergraduate Teaching Assistant**, The Ohio State University

2017 - 2018

CSE 3321: Automata and Formal Languages

Summer 2017, Fall 2017, Spring 2018

### **Undergraduate Honors Math Mentor**, The Ohio State University

2016 - 2017

Math 4181H: Honors Analysis I

Fall 2016

Math 4182H: Honors Analysis II

Spring 2017

## RELEVANT COURSEWORK AND SKILLS

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**GMU Coursework:** Optimization for machine learning, deep learning, computer vision, theory of computation, algorithms, graphics, software testing.

**OSU Math Coursework:** Real analysis, linear algebra, differential equations, probability, statistics, combinatorics, complex analysis, number theory, abstract algebra.

**OSU CS Coursework:** Software, digital logic, databases, operating systems, networking, theory of computation, machine learning, neural networks, natural language processing, GPU programming (CUDA).

**Programming:** Python (PyTorch, TensorFlow), Bash, Java, C, Git, Latex